The Federal Home Loan Bank System: The "Other" Housing GSE

MARK J. FLANNERY AND W. SCOTT FRAME
Flannery is the Bank of America Professor of Finance at the University of Florida in Gainesville. Frame is a financial economist and associate policy adviser in the Atlanta Fed's research department. *They thank Gerald Dwyer, David Feldhaus, Richard Fritz, William Jackson, Christopher McEntee, Joseph McKenzie, Wayne Passmore, Steven Patrick, and Larry Wall for comments on an earlier draft. The authors also thank Stella Lang at the Federal Home Loan Bank of Atlanta, staff at the Federal Home Loan Banks Office of Finance, and Ellen Hancock and Joseph McKenzie at the Federal Housing Finance Board for helpful background information, and Brandon Lockhart for valuable research assistance.*

The federal government has played an active role in residential mortgage finance since the Great Depression.[1] Prior to that time, mortgages typically had short terms (often less than five years), carried variable rates, and required final "balloon" payments that were generally refinanced. In the early 1930s residential real estate values (and financial asset values generally) fell dramatically. Coupled with limited refinancing opportunities, this decline generated a wave of mortgage defaults and foreclosures, further depressing the housing market. The federal government responded to this crisis by creating several financial institutions to promote the use of long-term, fixed-rate, fully amortizing residential mortgages. The first of these new institutions was the Federal Home Loan Bank System (FHLB System), which was created in 1932 as a collection of cooperatively owned wholesale banks.

Historically, the twelve Federal Home Loan Banks (FHLBs or Banks) primarily acted as a reliable provider of long-term funding to specialized mortgage lenders. Specifically, the Banks made (over)collateralized loans, known as "advances," to thrift institutions and a few insurance companies. While the advance business has endured, the FHLB System has evolved since the resolution of the 1980s thrift crisis.

The Financial Institutions Recovery and Reform Act of 1989 (FIRREA) included two provisions that precipitated lasting changes for the FHLBs. First, the law opened FHLB membership to all depository institutions with more than 10 percent of their portfolios in residential mortgage-related assets. This change allowed many commercial banks and credit unions to join the FHLB System for the first time. Membership increased from 3,200 to more than 8,000 between 1989 and 2005 despite the declining number of federally insured thrifts, which were legally required to be FHLB members until 1999. The transition from mandatory to voluntary FHLB membership also arguably forced the Banks to become more attuned to their members' desire for attractive advance rates and dividend payments. Second, FIRREA imposed "income taxes" on the individual FHLBs. They must now pay 20 percent of

net earnings to cover a portion of the interest on the Resolution Funding Corporation (REFCORP) bonds used to finance the thrift cleanup; another 10 percent is set aside for low- and moderate-income housing programs.

The statutory changes in FIRREA encouraged the FHLB System to grow and to increase its attention to profitability. Between 1989 and 2005 FHLB System total assets increased from about $175 billion to $1 trillion, and its composition of assets changed. Besides a secular increase in advances, FHLB balance sheets have also come to include substantial investment in marketable securities (especially mortgage-backed securities) and member-guaranteed mortgage pools. This shift, in turn, has resulted in the Banks managing an increasing amount of interest rate risk, including the embedded call options associated with mortgage prepayment.

Financial economists recognize that public guarantees of a private firm's debts can lead the insured firm to take greater risks than it otherwise would.

The FHLBs' growth and profitability trends have been further reinforced by the advances in information technology and financial practice that contributed to financial services consolidation. Even though they are the largest users of FHLB advances, the very largest U.S. depository institutions maintain regional or nationwide branch networks and access to various other wholesale borrowing mechanisms. Furthermore, many of these institutions maintain charters in more than one Bank district, thereby allowing for multiple channels into the FHLB System. These trends have served to heighten competitive pressures within the cooperative and suggest that the FHLB advances are but one of many different sources of nondeposit funding. While the FHLB System has grown in size, complexity, and risk over time, very little research has been published about this institution.[2]

A government-sponsored enterprise (GSE) is a financial institution chartered by Congress but owned by private shareholders (cooperative members or outside investors, depending on the ownership arrangement). Today three GSEs serve housing (the FHLB System, Fannie Mae, and Freddie Mac), and two others serve agriculture (the Farm Credit System and Farmer Mac).[3] GSE debt securities are commonly described as "U.S. agency" obligations, which are perceived by investors to be implicitly guaranteed by the U.S. government despite explicit, legally prescribed denials in offering materials. Financial economists recognize that public guarantees of a private firm's debts (either explicit or implicit) can lead the insured firm to take greater risks than it otherwise would ("moral hazard").[4] This moral hazard, in turn, imposes a potential cost on taxpayers in the event of financial distress.

The public has recently learned of several significant financial or accounting problems at housing GSEs. In 2002 Fannie Mae disclosed a significant exposure to interest rates as measured by their "duration gap."[5] The following year the GSEs' regulator, the U.S. Office of Federal Housing Enterprise Oversight (OFHEO), found that Freddie Mac had engaged in questionable accounting practices that allowed the company to manage its earnings by deferring $5 billion of income into future years.[6] Most recently OFHEO determined that Fannie Mae inappropriately applied hedge accounting rules and misclassified assets, overstating its equity by $10.8 billion.[7] Problems have also arisen within the FHLB System during this time. Standard & Poor's has downgraded derivative counterparty ratings for three FHLBs (Chicago, New York, and Seattle) from AAA to AA+ and currently maintains a "negative outlook" on six FHLBs (Chicago, Dallas, Des Moines, Indianapolis, Pittsburgh, and Seattle).[8] In all but one instance (New York), the downgrades and outlook changes

were triggered by concerns about individual FHLBs' ability to manage their interest rate risk exposures.

The troubles experienced by some FHLBs came as a surprise to many observers since cooperatives and mutuals are often viewed as less risky than stock-owned firms. Perhaps more precisely, the operation and incentives of cooperative firms are less well understood than those of traditional firms. Recent testimony by former Federal Reserve Board Chairman Alan Greenspan (2004), for example, noted that the FHLBs are more "complex to analyze than other GSEs and hence raise additional issues."

The principal contribution of this article is to identify and analyze differences in the FHLBs' risk-taking incentives vis-à-vis those for Fannie Mae and Freddie Mac. We begin by characterizing housing GSEs generally and then examine the structure, activities, and risks of the FHLB System in particular.

Housing GSEs

The history of U.S. housing GSEs began during the Great Depression with the creation of the FHLB System in 1932. That system has operated for nearly seventy-five years with essentially the same corporate structure (described below). The National Housing Act of 1934 then created the Federal Housing Authority (FHA) to operate a mortgage insurance program; the act also provided for the chartering of national mortgage associations as entities within the federal government. The only association ever formed was the National Mortgage Association of Washington in 1938, which eventually became the Federal National Mortgage Association (Fannie Mae). In 1968 Fannie Mae was converted into a private corporation, with publicly traded shares listed on the New York Stock Exchange (NYSE). Freddie Mac was chartered by Congress in 1970 to securitize mortgages originated by thrifts. During the 1970s and 1980s, Freddie Mac was technically a private company although its equity shares were held

1. For a discussion of the development of U.S. mortgage markets since the 1930s, see, for example, Quigley (2005) and Green and Wachter (2005).
2. An EconLit search uncovered seven published academic articles primarily concerning the operation of the FHLB System itself: Silber (1973), Jaffee (1976), Goldfeld, Jaffee, and Quandt (1980), Mays (1989), Hoffman and Cassell (2002), Frame (2003), and Nickerson and Phillips (2004).
3. The Student Loan Marketing Association (Sallie Mae) is also a GSE serving education, but it is in the process of privatization under the name SLM Corporation.
4. This moral hazard may also allow the guaranteed firm to grow abnormally large. In the case of housing GSEs, their large scale has resulted in systemic risk concerns as the institutions have become the central players in the U.S. housing finance system and markets for certain U.S. dollar interest rate derivatives.
5. Duration gap is the difference between the weighted-average duration of assets and the weighted-average duration of liabilities for a given change in interest rates. Frame and White (2004) provide a brief summary of Fannie Mae's duration gap episode while Jaffee (2003) provides greater detail on the practice of interest rate risk management at both Fannie Mae and Freddie Mac.
6. See Baker-Botts LLP (2003) for a detailed discussion of the questionable financial transactions and an evaluation of their treatment under generally accepted accounting principles. Baker-Botts was retained by the board of directors of Freddie Mac. See U.S. OFHEO (2003) for the supervisory analysis of these issues.
7. Kopecki (2005) reports an estimated cumulative after-tax write-down of $10.8 billion for the 2001–04 period. See U.S. OFHEO (2004) and Paul, Weiss, Rifkind, Wharton, and Garrison LLP (2006) for discussions of the problems with Fannie Mae's accounting policies, internal controls, and financial reporting processes.
8. Moody's has neither downgraded any FHLBs nor placed any of the institutions under a "negative outlook."

The Housing GSEs' Federal Charters

Congress has bestowed some benefits on the housing GSEs that result in lower costs. In terms of operating costs, the three housing GSEs are exempt from paying state and local corporate income taxes and are not required to register their debt and mortgage-backed securities issues with the Securities and Exchange Commission (SEC).[1] Several other features of the GSE charters cumulate to much larger savings by lowering the housing GSEs' funding costs.

The markets appear to believe that the GSEs' obligations carry an implicit federal guaranty. Why? First, the U.S. Treasury is authorized to purchase housing GSE securities up to $2.25 billion for both Fannie Mae and Freddie Mac and up to $4 billion for the FHLB System. Second, housing GSE securities are considered government securities under the Securities and Exchange Act of 1934 (hence their exemption from registration). This status means that housing GSE securities can be used as collateral for public deposits, can be bought and sold by the Federal Reserve in open market operations, and may be held in unlimited amounts by federally insured depository institutions. Third, housing GSE securities are eligible for issuance and transfer through the Federal Reserve System's book-entry system, the same used by the U.S. Treasury. Finally, housing GSEs are not subject to the bankruptcy code since they are considered to be "federal instrumentalities." No resolution mechanism has been specified in the event that one of these firms fails, and hence congressional action would be required.[2] This action is unlikely to occur quickly.

The housing GSEs' federal charters also impose some important limitations. First, the activities of each institution are largely limited to residential mortgage finance. Fannie Mae and Freddie Mac securitize and invest in only "conforming" mortgages (or securities backed by such mortgages) or those below $417,000 for 2006; the FHLBs make advances collateralized (almost exclusively) by mortgages or investment securities and invest in mortgages and mortgage-backed securities. Second, each housing GSE has certain social obligations. For example, in 2006, 53 percent of Fannie Mae's and Freddie Mac's business must benefit low- and moderate-income families, 38 percent must benefit underserved areas, and 23 percent must serve "special affordable" needs. The FHLBs contribute at least 10 percent of their net earnings to low- and moderate- income housing programs and are also responsible for paying interest on the REFCORP bonds that were issued in the early 1990s to resolve the savings and loan crisis. Finally, all three housing GSEs are subject to safety-and-soundness oversight, which may entail further restrictions on their scale or activities.

1. Until recently none of the housing GSEs registered their equity securities with the SEC. Fannie Mae and Freddie Mac volunteered to do so in July 2002 although only Fannie Mae, to date, has followed through on that commitment, registering in March 2003. In 2004 the Finance Board required each FHLB to register its equity with the SEC—a process that should be completed by the end of 2006.
2. In the case of Fannie Mae and Freddie Mac, their federal safety-and-soundness supervisor (OFHEO) does not have receivership authority. By contrast, as noted by Carnell (2005), the Finance Board has broad authority to liquidate or reorganize any Federal Home Loan Bank (12 U.S.C. 1446).

solely by the twelve FHLBs and their thrift members.[9] Freddie Mac was converted into a publicly traded company in 1989, with its shares listed on the NYSE.

Each of the three housing GSEs operates under its own federal charter, which both limits its permissible activities and bestows several institutional benefits (see the sidebar above). The most valuable of these benefits arises from the financial markets' perception that the federal government implicitly guarantees housing GSE obligations. As a result, GSE senior debt obligations are rated AAA even though their stand-alone ratings would be lower.[10] The implicit guaranty allows the GSEs to borrow

at favorable interest rates and then pass some of these savings on to their customers. Hence, by chartering a specific GSE, the federal government can target benefits toward a specific sector of the economy without recognizing the attendant opportunity costs in the federal budget.[11] However, potential costs remain if Congress were to provide support to an insolvent GSE. In the late 1980s, for example, the Farm Credit System received a $4 billion taxpayer bailout.[12]

The market's perception of an implicit guaranty of housing GSE obligations distorts the institutions' risk-taking incentives in a way that may increase the probability of financial distress. A similar situation is well understood in the context of federally insured depository institutions. The idea is that a federal guaranty induces bondholders (depositors) to accept artificially low (perhaps even risk-free) promised interest rates regardless of an institution's true risk of default. GSEs and insured depositories can then increase the riskiness of their activities—which promise high shareholder returns if the risks turn out well—without needing to share those rewards with liability holders in the form of higher coupon rates on their debt (deposits or bonds). The firms' equity holders thus perceive a greater-than-normal benefit from risk taking, and their investment decisions can distort capital flows and decrease the expected benefits of financial intermediation in the economy. If this increase in risk occurs, taxpayers effectively subsidize the equity holders of GSEs and insured depository institutions.

It is important to recognize that insured entities need not explicitly decide to increase their risks. Such a move could be inadvertent. For example, growing businesses often do not improve their infrastructure as quickly as they raise new revenues. If the creditors of a fully private firm felt that its risk-management systems had become inadequate, they could pressure the firm to improve those systems. If the firm failed to respond, its bond and stock prices would fall, raising the possibility of a hostile takeover. Federally guaranteed firms, by contrast, do not benefit from this market discipline, through which outsiders' concerns about such errors of omission can be expressed. If the federal guaranty is considered sufficiently strong, bond claimants may not bother to examine the firm's infrastructure.

The federal government recognizes these potential moral hazards and has created safety-and-soundness regulators to limit potential taxpayer exposure. Fannie Mae and Freddie Mac are regulated by OFHEO, an independent agency within the U.S. Department of Housing and Urban Development (HUD).[13] The FHLB System is overseen by the Federal Housing Finance Board (Finance Board), an independent

9. Moreover, Freddie Mac's board of directors consisted of the three board members of the FHLB Board, which regulated the FHLBs and the thrift industry during that time.
10. Fannie Mae and Freddie Mac receive AA– ratings from Standard and Poor's in terms of their risk to the government. However, such ratings incorporate whatever government support or intervention the entity typically enjoys during the normal course of business. See Frame and Wall (2002) for a discussion. Those two GSEs also receive "bank financial strength" ratings from Moody's (on an A–E scale), which are B+ (Fannie Mae) and A– (Freddie Mac).
11. The appendix to the federal budget, however, discusses each of the five GSEs and provides basic information about their mission, history, and financial condition. Although additional costs result from resource misallocations in the real sector, such costs are not recognized in the budget.
12. The U.S. General Accounting Office (GAO) (1990, 90–91) discusses this episode as well as one in the late 1970s, when Fannie Mae was insolvent on a market-value basis and benefited from supervisory forbearance.
13. OFHEO was created by the Federal Housing Enterprises Financial Safety and Soundness Act of 1992. Prior to 1992 HUD maintained exclusive regulatory oversight responsibilities for Fannie Mae and (for 1989–92) Freddie Mac. HUD continues to act as the mission regulator of the two institutions. Before FIRREA's passage Freddie Mac was the responsibility of the FHLB Board.

Table 1
Federal Home Loan Bank System Combined Balance Sheet as of March 31, 2006

	Dollars (in millions)	Percent of assets
Assets		
Advances	614,653	61.2
Mortgage loans (net)	103,530	10.3
Investments	279,012	27.8
Mortgage-backed securities	124,364	12.4
Federal agency securities	20,203	2.0
Other investment securities	10,051	1.0
Federal funds	86,925	8.7
Interest-bearing deposits	34,470	3.4
Reverse repurchase agreements	2,998	0.3
Other assets	6,588	0.7
Total assets	1,003,783	100.0
Liabilities and capital		
Consolidated obligations (net)	918,162	91.5
Other liabilities	40,342	4.0
Membership capital stock	42,602	4.2
Retained earnings	2,814	0.3
Other comprehensive income	(138)	0.0
Total liabilities and capital	1,003,783	100.0

Source: Federal Housing Finance Board

agency within the executive branch.[14] Each regulator is authorized to set risk-based capital standards, conduct examinations, and take certain enforcement actions if unsafe or unsound practices are identified. Nevertheless, both regulatory agencies have been criticized for their alleged ineffectiveness.[15]

Ironically, federal supervision of the GSEs may encourage investors' faith in a federal guaranty, despite the government's and the GSEs' explicit disavowals. As a theoretical matter, it is unclear whether the presence of these safety-and-soundness regulators increases or decreases expected taxpayer exposure (Frame and White 2004).

Structure, Activities, and Risks of the FHLB System

The FHLB System includes twelve regional wholesale Banks and an Office of Finance that acts as the FHLBs' gateway to the capital markets.[16] Each Bank is a separate legal entity, cooperatively owned by its member financial institutions, and has its own management, employees, and board of directors. Historically, the individual FHLBs did not compete for members. Each Bank is assigned a distinct geographic area, within which it tries to attract members by offering various credit products, investment products, payments services, and custody services.[17] The FHLB System is often viewed as a whole because most Bank financing takes the form of debt for which the twelve Banks are jointly and severally liable.

Table 1 presents a combined balance sheet for the FHLB System as of March 31, 2006.[18] The largest asset category is member advances ($615 billion, or 61.2 percent

of total assets), which constitute the primary avenue by which the FHLBs may support housing and community development. Advances are available in various maturities, carry fixed or variable rates of interest, sometimes contain embedded options, and are fully collateralized. In terms of maturities, as of March 31, 2006, 39.8 percent of advances were due in less than one year, 46.6 percent were due in one to five years, and 13.6 percent were due thereafter. Put and call options that can alter the duration and yield of an advance were included in 21.2 percent of the Banks' combined advance book at the end of the first quarter of 2006.[19] The most common forms of advance collateral are mortgage-related assets (whole loans and mortgage-backed securities) and U.S. Treasury and federal agency securities.[20] Beyond their explicit collateral, the FHLBs also have priority over the claims of depositors and almost all other creditors in the event of a member's default (12 U.S.C. 1430[e]).[21] No FHLB has ever suffered a credit loss on an advance.

The troubles experienced by some FHLBs came as a surprise to many observers since cooperatives and mutuals are often viewed as less risky than stock-owned firms.

Each FHLB maintains a portfolio of investments, which on a combined basis totaled $279 billion at the end of the first quarter of 2006. For liquidity, the FHLBs hold $124.4 billion in short-term investments, such as federal funds and certificates of deposit, issued by highly rated institutions. The Banks also hold longer-term investments to enhance interest income ($154.6 billion), especially residential mortgage-backed securities.

The FHLB System's combined balance sheet has come to include a substantial proportion of residential mortgages (10.3 percent) since the introduction of the Chicago FHLB's Mortgage Partnership Finance Program in 1997. The Banks now purchase

14. The Finance Board was established by FIRREA in 1989 as the regulator of the FHLB System, thereby replacing the FHLB Board. A five-member board of directors governs the Finance Board; the president appoints four full-time members with the advice and consent of the Senate for seven-year terms, designating one of the four as chair. The secretary of HUD is the fifth member.
15. For example, U.S. Treasury Secretary Snow (2003) testified before Congress that there is a "general recognition that the supervisory system for the housing GSEs neither has the tools, nor the stature, to effectively deal with the current size, complexity, and importance of these enterprises."
16. The twelve FHLBs are located in Atlanta, Boston, Chicago, Cincinnati, Dallas, Des Moines, Indianapolis, New York, Pittsburgh, San Francisco, Seattle, and Topeka. The Office of Finance is located in Reston, Virginia.
17. The specific products and services offered by the individual FHLBs can often be found on their respective Web sites. Visit www.fhfb.gov/FHLB/FHLBS_banks.htm for links to all twelve FHLBs and a list of states served by each individual Bank.
18. This information was provided by the Finance Board. Audited financial statements for the combined FHLB System are unavailable pending the completion of each Bank's registration with the Securities and Exchange Commission.
19. Putable advances, which provide the FHLB with an option to require the borrower to repay on prespecified exercise dates before maturity without a fee, made up 16.6 percent of advances. The Atlanta and New York FHLBs together account for more than half of putable advances outstanding. Callable advances, which provide the member with an option to prepay on prespecified exercise dates, made up 4.6 percent of advances. The Cincinnati Bank is responsible for three-quarters of these loans.
20. See 12 U.S.C. 1430(a)(3) for a complete list of eligible collateral. Federal agency securities are generally synonymous with debt and mortgage-backed securities issued by GSEs.
21. Bennett, Vaughan, and Yeager (2005) describe how FHLB advances may increase the probability of bank default and raise the FDIC's expected losses given default.

Table 2
Federal Home Loan Bank Holdings of Mortgages and MBS as of March 31, 2006

	Mortgages (millions of dollars)	MBS (millions of dollars)	Mortgages + MBS (millions of dollars)	Mortgages + MBS (percent of assets)
Atlanta	2,855	18,728	21,583	15.50
Boston	4,838	6,403	11,214	18.31
Chicago	40,931	8,199	49,130	55.95
Cincinnati	8,425	12,395	20,820	26.31
Dallas	518	8,510	9,028	15.88
Des Moines	12,714	5,147	17,861	40.35
Indianapolis	9,867	6,805	16,672	34.37
New York	1,457	9,127	10,584	12.40
Pittsburgh	7,440	9,381	16,821	23.19
San Francisco	5,079	27,072	32,151	14.15
Seattle	7,003	6,599	13,602	25.48
Topeka	2,409	5,999	8,408	17.49
FHLB System	103,537	124,364	227,901	22.70

Source: Federal Housing Finance Board

conforming fixed-rate mortgages on single-family properties from participating member institutions under several distinct programs.[22] Roughly speaking, the seller guarantees most of the mortgages' credit risk, while the interest rate risk is borne by the FHLBs (Frame 2003). This mortgage-related interest rate exposure is reinforced by substantial FHLB holdings of mortgage-backed securities (MBS). Table 2 shows that nearly one-quarter of FHLB System assets were mortgage related at the end of the first quarter of 2006: $103.5 billion in whole mortgages plus $124.4 billion in MBS. All twelve FHLBs invest more than 12 percent of their asset portfolios in mortgage-related assets. The largest concentrations are the Chicago (56.0 percent), Des Moines (40.4 percent), and Indianapolis Banks (34.4 percent).

The FHLB asset portfolios are largely funded with debt, almost all of which takes the form of "consolidated obligations" issued by the Office of Finance and for which the twelve Banks are jointly and severally liable. As of March 31, 2006, the FHLB System had $918.2 billion in consolidated obligations outstanding. Discount notes (maturities up to one year) represented 17.1 percent of consolidated obligations, and bonds (maturities almost exclusively between one and ten years) the remaining 82.9 percent. The FHLB System also maintained $45.3 billion in equity capital at that time (4.5 percent of total assets). Member stock subscriptions are the dominant form of equity, making up 94 percent of total FHLB System equity. History can readily explain the unusually small contribution of retained earnings to total capital: Congress previously took the Banks' retained earnings to help pay for the thrift bailout. Thereafter the FHLBs began to pay out almost all earnings as dividends. The Financial Modernization Act of 1999 clarified that a particular class of FHLB shareholders would legally own the institutions' retained earnings (as well as surplus, undivided earnings, and equity reserves) going forward.[23]

The FHLBs face little credit risk in their asset portfolios. As shown in Table 2, however, they hold substantial amounts of mortgage-related assets. The interest rate risk from these assets requires careful treatment because changes in interest rates influence borrower prepayment behavior, which in turn has implications for the

expected life of mortgage assets. For example, when interest rates rise, mortgage investors experience losses in value because they are holding fixed-rate debt instruments yielding a below-market rate of return, and the duration of the asset increases because of lower expected borrower prepayments. In a falling-rate environment, the normal value gains associated with holding fixed-rate debt instruments are reduced by an associated increase in expected prepayments. This phenomenon of additional adverse effects on mortgage investors from decreases or increases in interest rates is often described as the "negative convexity" of the mortgage instrument.

Callable bonds provide one important and straightforward way for the FHLBs to hedge mortgage-related interest rate risk.[24] By issuing callable bonds, if interest rates fall and mortgages prepay, the Banks can replace their higher-cost bonds with new ones bearing a lower rate of interest. The Banks also regularly use interest rate derivatives to transform their liability maturities and to hedge some of the negative convexity associated with fixed-rate mortgages. On March 31, 2006, the FHLB System had $867.6 billion in total (notional amount) interest rate exchange agreements outstanding—mostly interest rate swaps.

It is very difficult to discern how much interest rate risk the FHLB System actually retains. The FHLBs' primary measure of interest rate risk exposure is the duration of equity, or the sensitivity of a theoretical market value of a Bank's equity to changes in interest rates (FHLB Office of Finance 2004, 47). However, as discussed in Frame and Wall (2002) and elsewhere, duration analysis may not be well suited to measuring interest rate risk for portfolios containing numerous embedded options. Moreover, these duration positions are reported to the Finance Board only quarterly, and individual FHLBs' measurements are not directly comparable across institutions. A review of these figures as of March 31, 2006, suggests that there is significant variation across FHLBs—either in terms of their exposures or reporting practices.

The Finance Board protects FHLB solvency by enforcing leverage and risk-based capital requirements. Two leverage requirements are set in statute at 4 and 5 percent of total assets, respectively, depending on the form of equity.[25] The Finance Board also computes a risk-based capital requirement based on each Bank's credit, market, and operational risks. On March 31, 2006, required risk-based capital for the individual FHLBs ranged from 0.4 to 1.2 percent of total assets—well below their leverage capital standards. Capital adequacy could alternatively be evaluated in the context of each Bank's fair value balance sheets. On March 31, 2006, these fair values (as estimated by the Banks and reported to the Finance Board) ranged between 76.7 percent and 100.7 percent of book value across the FHLB System. In addition, a positive/negative

22. As of late 2004 eight FHLBs exclusively offered the Mortgage Partnership Finance Program in conjunction with the Chicago FHLB, while three exclusively offered their own Mortgage Purchase Programs. The Atlanta FHLB offers both options to its members. Conforming mortgages have principal amounts that are eligible for purchase by Fannie Mae and Freddie Mac. For single-family mortgage loans, the conforming loan limit is $417,000 in 2006.
23. The Finance Board recently issued a proposed rule to increase retained earnings (see www.fhfb.gov/GetFile.aspx?FileID=4476). However, Paletta (2006) reports that the twelve FHLBs collectively sent a letter to their regulator in opposition.
24. During the first six months of 2004, 57.5 percent of FHLB System bond sales were callable, 16.6 percent were fixed rate, 13 percent carried floating rates, and 9.3 percent were "step-ups/step-downs."
25. The "unweighted" requirement is that total capital (class A stock, class B stock, retained earnings, and general loan loss allowances) must be at least 4 percent of total assets. A "weighted" requirement sets this standard at 5 percent but has permanent capital (class B stock and retained earnings) multiplied by 1.5.

200 basis point change in interest rates is estimated to affect these fair values by 0.5 to 9.8 percent in absolute value, depending on the institution and direction of interest rate shock.

To summarize, the FHLB System is a very large and highly leveraged financial institution. This GSE appears to face little credit risk but a material amount of interest rate risk arising from its mortgage-related asset holdings. The individual FHLBs manage their interest rate risk by issuing callable debt and entering into interest rate derivative contracts, although their net exposure is unclear.

Ownership and Governance of the FHLB System

The financial markets' perception of an implied federal guaranty of FHLB System debt, coupled with the joint-and-several liability of these same obligations, insulates individual FHLBs' funding costs from their exposure to risk. While the incentives created by such a guaranty for profit-maximizing firms like Fannie Mae and Freddie Mac are reasonably well understood, the FHLB System has a different organizational structure and hence most likely responds differently to changing circumstances.

Ownership. Each FHLB is a mutual organization owned by its financial institution members. By statute, membership is restricted to banks, thrifts, credit unions, and insurance companies that are chartered within the FHLBs' legally defined service area. A stock purchase is required for membership, and formal control of each Bank lies with an elected board of directors. The Financial Modernization Act requires each Bank to design a stock purchase requirement for its members, based on two classes of stock: Class A stock is redeemable on six months' written notice from the member, and class B stock on five years' notice.[26] Members resigning their membership are subject to a five-year lockout from the FHLB System.

Table 3 summarizes the new capital structure plans developed by the eleven FHLBs that had them in force as of March 31, 2006.[27] Despite significant variation in the specific stock purchase requirements across districts, most of the plans share some general characteristics. First, almost all of the FHLBs rely exclusively on the more permanent class B shares. Second, the stock purchase requirements contain both "membership" and "activities" components. The membership component is generally tied to a measure of member size (for example, total assets or total mortgage assets), while the activity-based component tends to depend on activities that directly affect the size of a Bank's balance sheet, such as advances or purchased mortgages. Finally, each of the requirements is specified with ranges to allow each Bank to adjust stock purchase requirements without having to seek Finance Board approval.

The new capital plans also include some noteworthy differences. Most obviously, the capital requirements for similar activities often vary across the Banks. For example, the activity requirement for FHLB-acquired mortgages varies especially widely, from 0 to 4.5 percent. Additionally, some FHLBs require members to purchase the sum of their membership and activities requirements, while other FHLBs require the greater of the two subrequirements. Such variation in member stock purchase requirements is unlikely to be problematic if institutions can apply for membership only in a single FHLB. But as we will see below, this proviso may be becoming outdated.

Governance. Table 4 shows that the twelve FHLBs differ substantially in both asset size and number of members. The San Francisco FHLB is the largest in terms of total assets ($227.2 billion), but it has the fourth-fewest number of members (376). Conversely, the Des Moines FHLB has the smallest balance sheet ($44.3 billion) but the largest membership (1,251). Perhaps even more important to note is

that each FHLB has a small group of large members. The five largest equity holders provide between 29 percent and 74 percent of the individual FHLBs' total equity, and the five largest borrowers are similarly prominent.

An elected board of directors controls the operations of each FHLB. Given the concentration of equity holdings noted in Table 3, one might suspect that each FHLB is easily controlled by a small group of large member institutions, but this is not true. Two important voting limitations make effective control much more diffuse than the equity ownership data would suggest (see 12 U.S.C. 1427[b]). First, no member may vote more than the average number of shares owned by members in its state as of the prior year's end. This rule limits concentration of voting rights because every state has large numbers of small institutions. Second, voting occurs on a state-by-state basis, and each state must have at least one director. To the extent that large members are not equally distributed among the states, therefore, concentrated control is even more limited.

Limiting voting rights does curtail direct control of the FHLBs by the very largest members: As of midyear 2004, only four of the ten largest FHLB shareholders held a Bank directorship. This fact does not indicate, however, that the desires of the very largest members go unheard since these institutions often have competitive wholesale funding alternatives.

Competition. Competitive pressures have been felt increasingly by the individual FHLBs. In terms of the asset portfolio, FHLB advances compete with secured and unsecured wholesale funding provided by investment banks, commercial banks, and brokered deposits. This competition is most intense for large depository institution members, which generally have extensive branch networks and ready access to public capital markets. One way that the FHLBs have responded to this development is by introducing more complicated advances, such as those with embedded options, which are attractive to institutions funding fixed-rate mortgage portfolios. FHLB mortgage programs are also in competition with securitization via Fannie Mae and Freddie Mac as well as outright whole loan sales through a nationwide secondary market.

Competition for members has also escalated. Prior to the Financial Modernization Act of 1999, federally insured thrift institutions were required to become FHLB members. Today, however, FHLB membership is voluntary. The commercial banks, thrifts, and credit unions chartered in a Bank's geographic territory will join only if they receive valuable services. In addition, some acquisitive financial institutions have retained charters in multiple FHLB districts, a practice that permits them to borrow from the FHLB offering the cheapest advances.[28] Today about 100 such cases exist, in effect creating a degree of inter-FHLB competition.[29] This practice has also spurred policy discussion about whether FHLB membership should be opened further to allow

26. Prior to this act, the law allowed for only one class of stock, which was redeemable on six months' written notice. The Chicago FHLB continues to be subject to this old framework.
27. The Chicago FHLB has not yet converted to the new capital structure. The Bank had originally received regulatory approval in 2002 for a capital plan that relied on members' discretionary stockholdings (excess stock) to support its mortgage portfolio. However, the Bank agreed in early 2005 to delay implementation to the new structure as part of a three-year business plan. Over this period the Bank expects to substantially reduce its ratio of excess stock to regulatory capital before converting to a revised capital plan.
28. For example, Washington Mutual Inc. currently maintains membership in four FHLBs: San Francisco, Seattle, Dallas, and New York.
29. See U.S. GAO (2003) for a discussion of competition within the FHLB System, including the role of the price and nonprice terms of credit.

Table 3

Federal Home Loan Bank Capital Plans: Membership Requirements, Activity Requirements, and Total Requirements

Panel A: Boston, New York, Pittsburgh, Atlanta, Cincinnati, and Indianapolis

	Boston	New York	Pittsburgh	Atlanta	Cincinnati	Indianapolis
Date of conversion	April 19, 2004	Dec. 1, 2005	Dec. 16, 2002	Dec. 17, 2004	Dec. 30, 2002	Jan. 2, 2003
Classes of stock	All B	All B with 2 subclasses	All B	All B with two subclasses	All B	All B with two subclasses
Membership investment requirements	0.35% of "membership stock investment base" (range: 0.05 to 0.50%) Membership stock investment base is the total nondiscounted assets eligible to secure advances (single- and multifamily mortgage loans, Treasury and agency securities, and MBS).	0.20% of "mortgage-related assets" (range: 0.10 to 0.25%) Mortgage-related assets are defined as "residential housing finance assets" (12 CFR 950.1) plus loans secured by manufactured housing, nonresidential nonfarm real property, and other mortgage-related securities.	0.55% of unused borrowing capacity (range: 0 to 1.5%)	0.20% of total assets (range: 0.05 to 0.40%)	Cumulative sliding scale that varies inversely with member's asset size At time of conversion scale was $0–$25B in assets: 0.15%; >$25B–$50B in assets: 0.10%; >$50B–$75B in assets: 0.07%; >$75B–$100B in assets: 0.05%; >$100B in assets: 0.03% (range: 0.03 to 0.30%)	1% of total mortgage assets (range: 0.75 to 1.25%)
a. Minimum membership requirement	$10,000 (range: $5,000 to $50,000)	$1,000	$10,000	None	None	$1,000
b. Maximum membership requirement	$25 million (range: $5 million to $100 million)	None	None	$25 million (range: $15 million to $35 million)	None	$35 million
Activity requirements					Ratio of par value of members' activity stock to members' mission asset activity must be between the minimum allocation percentage and the maximum allocation percentage.	

	Boston	New York	Pittsburgh	Atlanta	Cincinnati	Indianapolis
a. Advances	3% of outstanding principal balance of overnight advances plus 4.5% of outstanding principal balance of nonovernight advances (range: 3 to 6%)	4.5% of outstanding principal balance (range: 4 to 5%)	4.55% of all loans (range: 4.5 to 6.0%)	4.5% of outstanding principal balance (range 3.5 to 6.0%)	Requirement for minimum allocation percentage is 2%; requirement for maximum allocation percentage is 4% (range: 1 to 6%)	5% of outstanding principal balance (range: 2 to 5%)
b. Mortgage purchases	0% of outstanding principal balance (range: 0 to 6%)	4.5% of outstanding principal balance for loans delivered or commitments in effect after the effective date of the plan (range: 4 to 5%)	0% of AMA delivered and held by Bank (range: 0 to 4.0%)	0% of outstanding principal balance (range 0 to 6.0%)	Requirement for minimum allocation percentage is 0%; requirement for maximum allocation percentage is 4% (range: 0 to 6%)	0% of outstanding principal balance (range: 0 to 5%)
c. Standby letters of credit	4.5% of face/notional amount adjusted for conversion factor in 12 CFR 932.4(f) Table 2 (range: 3 to 6%)	0% for contingent liabilities, including lines of credit (range: 0% to risk-based capital requirement)	N/A	N/A	N/A	5% of commitment amount (range: 2 to 5%)
d. Exchange agreements	4.5% of the Bank's current exposure calculated per 12 CFR 932.4(h)(1) plus Bank's potential exposure calculated per 12 CFR 932.4(h)(2) (range: 3 to 6%)	0% of carrying value of derivatives (range: 0 to 5% of book value)	N/A	N/A	N/A	5% of the amount of collateral required from the transaction (range: 3 to 5%)
e. Other	Advance or delivery commitments: 0% of face/notional amount adjusted for conversion factor in 12 CFR 932.4(f) Table 2 (range: 0 to 6%)	N/A	N/A	Targeted debt/equity investments: 8.0% of outstanding principal balance (range: 6.0 to 9.0%)	Advance commitments: Requirement for minimum allocation percentage is 2%; requirement for maximum allocation percentage is 4% (range: 1 to 6%)	N/A
Total stock purchase requirement	Membership requirement plus activity requirement	Membership requirement plus activity requirement	Membership requirement plus activity requirement	Membership requirement plus activity requirement	Membership requirement plus activity requirement	Greater of membership requirement or activity requirement

(continued on next page)

Table 3 (continued)

Panel B: Des Moines, Dallas, Topeka, San Francisco, and Seattle

	Des Moines	Dallas	Topeka	San Francisco	Seattle
Date of conversion	July 1, 2003	Sept. 2, 2003	Sept. 30, 2004	April 1, 2004	June 30, 2002
Classes of stock	All B	All B	A and B	All B	All B with two subclasses
Membership requirements	0.12% of member assets (range: 0.10 to 0.25%)	0.09% of total assets (range: 0.05 to 0.30%)	0.2% of total assets (range: 0.1 to 0.4%) May only purchase class A stock to fulfill this requirement.	1% of "membership asset value," or assets qualified as FHLB collateral (range: 0.5 to 1.5%)	0.50% of home mortgage loans (range: 0.5 to 1.0%)
a. Minimum membership requirement	$10,000 (range: $10,000 to $30,000)	$1,000	$1,000	None	$500
b. Maximum membership requirement	$10 million (range: $10 million to $30 million)	$25 million (range: $10 million to $50 million)	$1 million (range: $500,000 to $2.5 million)	$25 million (range: $10 million to $50 million)	None
Activity requirements					
a. Advances	4.45% of outstanding principal balance (range: 3 to 5%)	4.10% of outstanding principal balance (range: 3.5 to 5%)	5.0% of outstanding principal balance (range: 4 to 6%)	4.7% of outstanding principal balance (range: 4.4 to 5%)	2.5% of outstanding principal balance (range: 2.5 to 4.5%)
b. Mortgage purchases	4.45% of outstanding principal balance (range 3 to 5%)	4.10% of outstanding principal balance (range: 0 to 5%)	2% of principal amount sold to Bank subject to cap of 1.5% of total assets as of preceding year-end (ranges: for req. 0 to 6%; for cap 1 to 3%)	5.0% of outstanding principal balance (range: 5.0 to 5.7%)	5.0% of outstanding principal balance (range: 0 to 6.0%)
c. Standby letters of credit	0.15% (range: 0 to 0.175%)	N/A	0% of outstanding principal balance (range: 0 to 1%)	N/A	N/A
d. Exchange agreements	N/A	N/A	0% of notional principal amount (range: 0 to 2%)	N/A	N/A
e. Other	Advance commitments: 0% (range: 0 to .35%) Mortgage purchase commitments: 0% (range: 0 to .60%)	N/A	N/A	Provision for capital assessment if capital level insufficient for Bank to meet minimum regulatory requirements or target ratios	N/A
Total stock purchase requirement	Membership requirement plus activity requirement	Membership requirement plus activity requirement	Greater of membership requirement or activity requirement; member only required to hold class B stock equal to the amount by which the activity requirement exceeds the membership requirement	Greater of membership requirement or activity requirement	Membership requirement plus activity requirement

Note: The table does not include the Chicago FHLB because that bank has not yet adopted the capital structure plans described.
Source: Federal Housing Finance Board and individual FHLB capital plans

Table 4
Federal Home Loan Bank Membership as of March 31, 2006

	Total assets (billions of dollars)	Number of members	Membership concentration as a percent of capital[a]	Membership concentration as a percent of advances[a]
Atlanta	139.3	1,210	38.9	49.0
Boston	61.4	467	36.7	47.3
Chicago	87.8	879	29.2	39.7
Cincinnati	79.1	742	50.0	60.4
Dallas	56.9	887	49.4	61.8
Des Moines	44.3	1,251	37.8	24.1
Indianapolis	48.5	434	46.5	52.9
New York	85.3	299	40.3	40.1
Pittsburgh	72.5	334	54.4	61.1
San Francisco	227.2	376	73.7	80.7
Seattle	53.4	367	53.8	65.1
Topeka	48.1	896	40.3	51.4

[a] Percentages for the five largest members
Source: Federal Housing Finance Board

any eligible financial institutions to access the FHLB System through multiple channels (multidistrict membership).[30]

Recent troubles at the Seattle FHLB illustrate how inter-Bank competition may induce risk taking. In 2002 the Seattle Bank decided to change its portfolio structure by substituting mortgage assets for advances. It shed advances by raising the interest rates on them. Washington Mutual, the largest borrower from the Seattle FHLB at that time, responded by moving a substantial part of its advance borrowings to other FHLBs in which its affiliates held memberships, although it maintained its stock investment. The low-interest-rate environment and mortgage refinance wave of 2003, coupled with imperfect hedging, resulted in a material decline in the Seattle FHLB's market value. The Seattle Bank responded by reducing its mortgage purchases, but instead of redeeming excess capital, the institution sought to boost returns by investing in callable FHLB System consolidated debt obligations funded largely with shorter-term, noncallable instruments. The flattening of the yield curve during 2004 resulted in additional market-value losses, which totaled $260 million by the end of that year.

Risk-Taking Incentives in the FHLB System

An important cost associated with financial institutions operating with government guarantees (implicit or explicit) is the aforementioned moral hazard incentive for such institutions to increase their risk exposure—on purpose or inadvertently—in order to maximize shareholder returns. The recent financial troubles at all three

30. This discussion started with some petitions by acquiring depository institutions to retain FHLB membership in the district of the target even though the target's charter would be dissolved; see U.S. GAO (2003). The Finance Board subsequently issued an advanced notice of proposed rule making about multidistrict membership in October 2001, but the regulator never promulgated regulations. Bair (2003) discusses in detail and analyzes the question of whether the Finance Board has the statutory authority to permit multidistrict membership.

housing GSEs may reflect this moral hazard. The difficulties experienced by some FHLBs are notable, however, because cooperatively owned firms are often thought to be less risky than stock-owned firms. Here we discuss some unique features of the FHLB System that may act to enhance or subdue FHLB risk-taking incentives relative to Fannie Mae and Freddie Mac.

Ownership structure. Some of the FHLBs have argued that their cooperative structure mitigates moral hazard incentives. In 2003 the president of the Federal Home Loan Bank of Dallas testified before Congress that

> the [Federal Home Loan] Banks' cooperative corporate structure reinforces our conservative approach to risk management and eliminates many of the incentives that a publicly traded company might have to increase its risk profile in hopes of achieving higher returns for its shareholders. There is no stock compensation for management, directors, or employees of the Banks. (Smith 2003, 31)

Two years later, the president of the Atlanta FHLB expressed a similar view:

> The cooperative structure of the FHLBanks eliminates many of the incentives a publicly traded company might have to raise its risk profile in search of higher returns. (Christman 2005, 7)

Under some circumstances, cooperatively owned financial institutions can be less prone to risk taking than their stock-owned counterparts. Moral hazard arises because the shareholders and bondholders (or their guarantor) have conflicting preferences about risk taking. Many leveraged cooperative and mutual financial institutions combine the equity and debt claims to eliminate this potential conflict. For example, credit union and mutual thrift depositors (liability holders) are also owners (equity holders). Empirical evidence for thrifts and insurance companies strongly supports the notion that such cooperative and mutual firms are less risky.[31]

Unfortunately, the analogy between these cooperatives and the FHLB System is not precise. The Banks' equity holders are the member financial institutions, while their bondholders are widely dispersed throughout the capital markets. These two groups remain distinct in the FHLB structure, rendering the "bundling of claims" argument inapplicable. Hence, the cooperative structure of the FHLB System does not necessarily insulate the Banks from excessive risk taking.

Joint and several liability. The cross-guarantee provision in the FHLB System's consolidated debt obligations likely reinforces the moral hazard arising from the perceived federal guaranty.[32] Funding costs for the individual Banks reflect the average risk of the FHLB System rather than the exposure of any one institution. Hence, any FHLB System-wide incentive to increase risk because of the perceived implied federal guaranty is further accompanied by an incentive at the individual FHLB level to increase risk relative to its sister institutions, as might be induced by competition for members. In this way, moral hazard incentives could be heightened relative to Fannie Mae and Freddie Mac.

Equity market discipline. For publicly traded firms, share prices may act as a disciplining force; for example, financial difficulties can spur a price decline and signal to management that it should reduce risk. However, for financial institutions that operate with (implicit or explicit) government guarantees, such as the housing-related GSEs, this relationship is less clear. Since the cost of their liabilities is not risk-sensitive, these institutions may be inclined to respond to share price declines by

actually increasing risk. Regulators are charged with monitoring such behavior. In any event, equity market discipline is not even present for the FHLBs since the stock is not traded. Indeed, Bank equity is always exchanged at par so that neither the public nor the regulators will ever see a price decline signaling potential trouble.

Each member's FHLB stock can be separated into a required component (as described in Table 3) and an "excess" component. In order to redeem its required membership stock, the institution must resign from the FHLB and may not rejoin it for five years. This lock-out period represents a significant opportunity cost that renders equity market discipline through membership withdrawal unlikely.

It is important to recognize that insured entities need not explicitly decide to increase their risks. Such a move could be inadvertent.

Some members also hold "excess" stock as an investment, which a Bank can leverage to generate additional earnings. Under most circumstances, members can redeem their "excess" stock at par upon demand.[33] So, if a Bank suffers losses or becomes more risky, some members may try to withdraw their excess stock. This action would force the Bank to reduce its scale of operations—a general form of market discipline. However, this avenue is also partially blocked. The FHLB may deny early redemption requests (before six months for class A and before five years for class B shares) at its discretion (12 U.S.C. 1426[e][1]), and, if a Bank's safety and soundness becomes questionable, both the Bank and the Finance Board can limit redemption indefinitely (12 C.F.R. 931.8). This discretion limits market discipline because it provides time for a troubled FHLB to gamble for resurrection.

The recent episode at the Chicago Bank illustrates the lack of market discipline associated with excess stock. When that FHLB experienced accounting difficulties, excess stock redemption requests increased, but the Bank halted redemptions in late 2005 (see FHLB of Chicago 2005). In June 2006, the Finance Board permitted the Chicago FHLB to issue $1 billion of ten-year subordinated debt (for which the Bank is sole obligor) and to use the proceeds to repurchase excess shares.[34] One interpretation of this transaction is that it allowed the Chicago FHLB to increase its risk by substituting debt for equity. However, FHLB excess stock itself has debtlike features,

31. Esty (1997) examines the riskiness of thrifts during the 1980s and finds that stock-owned institutions had both riskier portfolios and higher failure rates than mutuals. Lamm-Tennant and Starks (1993) study property-liability insurers and uncover that stock-owned firms have riskier future cash flows as proxied by the variance of the loss ratio. Lee, Mayers, and Smith (1997) find that risk in the asset portfolios of stock-owned property-liability insurers increased markedly relative to their mutually owned counterparts following enactment of state guaranty fund laws.
32. One counterargument to this assumption is that joint and several liability may induce the FHLBs to monitor one another. However, the Banks may lack the willingness to do so because of standard "free-rider" problems, the presence of the conjectural federal guaranty, and the fact that they have no authority to directly discipline each other.
33. For this reason, excess stock is actually treated as a liability by the Banks according to Financial Accounting Standards Board Statement 150, *Accounting for Certain Financial Instruments with Characteristics of Both Liabilities and Equity*. The Finance Board, however, treats excess stock as equity for purposes of determining compliance with minimum regulatory capital requirements. Shadow Financial Regulatory Committee (2006) has called on the Finance Board to rethink this position.
34. In doing so, the regulator granted certain waivers that will allow these debentures to be used in determining compliance with the Chicago Bank's regulatory leverage requirement (see Federal Housing Finance Board 2006).

and the lack of market pricing for these claims limits their value as market discipline tools. In any event, the future importance of excess stock holdings is currently questionable as the Finance Board recently proposed a rule that would limit excess stock to 1 percent of a Bank's total assets.

Charter value. Marcus (1984) identifies a factor that may reduce a guaranteed financial institution's interests in increasing its portfolio risk: nonmarketable charter value. This effect depends on the supervisor being able to close a firm whose book value of equity falls to zero even if the institution has "off book" assets that would remain valuable if the firm did not fail. In Marcus's example, a bank's charter value derives from its ability to borrow at subsidized (guaranteed) rates in the future, provided it remains in operation. Financial institutions with charter value effectively have more capital at risk than the book value of capital shown on their balance sheets. Since greater levels of capital reduce the incentive to engage in risky behavior, other things being equal, financial institutions with charter value will tend to be less risky.

Cooperative ownership itself does not reduce FHLB risk-taking incentives because, unlike many mutuals, the FHLB System does not bundle its equity and debt claims.

Frame and White (forthcoming) discuss the presence of charter value in the case of Fannie Mae and Freddie Mac. The FHLBs may similarly derive charter value from their ability to borrow at attractive rates in the agency debt market as well as from geographic membership restrictions. However, any disciplining role of charter value is likely to be less for the FHLBs than it is for Fannie Mae and Freddie Mac. First, the Banks' cooperative structure and diffuse control may result in less of the charter value actually accruing to owners because cooperative firms' managers can more easily capture economic rents for themselves (see, for example, Hansmann 1996). The limited competition for members among the Banks due to geographic boundaries creates similar issues. Second, in the event that a Bank's member-owners lost charter value because of a Bank's insolvency, these members would almost certainly have an opportunity to join the reconstituted institution or another FHLB.

Managerial incentives. Managerial incentives can sometimes counterbalance shareholders' incentive to take excessive risks. When they are paid a fixed salary, managers tend to avoid risk. They do not share in the good outcomes, and a bad outcome can substantially harm a manager's career prospects. Managerial preferences can thus diverge from shareholder preferences. To align managers' interests with those of shareholders, executive compensation often includes a performance-based element such as stock options.[35] Strictly speaking, cooperative and mutual institutions cannot provide equity-based compensation since they do not have traded equity. However, even a cooperative firm's executives can be offered incentive payments that may be correlated with risk taking.

Before 1999 the Finance Board limited the amount and the form of compensation packages that FHLB directors could offer Bank presidents. A base salary cap was established annually for each institution, and the president's incentive payments could not exceed 25 percent of that cap. The Financial Modernization Act rescinded the Finance Board's direct role over FHLB executive compensation. Since that time the incentive component of the FHLB presidents' actual compensation has roughly doubled relative to salary, from a mean of 22 percent of total compensation in 1999 to almost 40 percent in 2005.

Recent SEC filings provide detailed information on the criteria underlying incentive payments at some of the FHLBs. Much like publicly traded corporations, the reported FHLB incentive payments are tied primarily to the Banks' profitability and growth. For example, the Indianapolis FHLB awards incentive compensation to seven officers with the following weights on four goals: profitability (50 percent), increase in average total advances (25 percent), increase in mortgage purchase production (20 percent), and community investment advances originated (5 percent).[36] Some of the FHLBs also provide longer-term incentive payments, such as the Chicago FHLB's "Stock Equivalent Account":

> A Stock Equivalent Account ("SEA") shall be established for each award recipient hereunder. Payments to the SEA shall be credited as "shares" at $100 per share. "Shares" in the SEA shall earn interest at the same rate as the Bank's net return on equity after REFCO during each corresponding quarter. Interest shall be paid in the form of additional and fractional "shares" in the SEA. The interest calculation method herein shall apply to all existing SEA balances as of January 1, 1996. . . . SEA "shares" and interest thereon are vested on March 1 in the year following the year in which such "shares" were first credited to the SEA. . . . SEA "shares" may be converted to cash and withdrawn, at the option of the award recipient, as follows: (1) 50% upon vesting and (2) the balance one year after vesting.

SEA payments are similar to stock awards made by public corporations, although SEA value is based only on past earnings (and not expected future earnings) and cash-outs are subject to a one-year delay.

FHLB executives have been offered increasing incentives for profitability and growth, and both of these are correlated with risk taking. However, it is important to point out that FHLB incentive payments are much lower in both absolute and relative terms than those at Fannie Mae or Freddie Mac or at the typical large bank. Furthermore, FHLB executives are not granted stock options, which provide particularly strong risk-taking incentives. Emmons and Sierra (2004) report that in 2003 the chief executive of Fannie Mae (Franklin Raines) was paid a salary of $1 million, a bonus of about $4.4 million, and stock and options worth $15 million. Indeed, at the end of that year, Raines owned $17.4 million in stock outright plus options exercisable within sixty days to control another $113 million in stock. The authors also report that executive compensation arrangements at Freddie Mac were similar at that time.

Overall, there are some important differences between the FHLBs and Fannie Mae and Freddie Mac that influence each institutions' risk-taking incentives. Some differences suggest stronger risk-taking incentives at the Banks, while others do not. The extent to which each housing GSE gears its managerial compensation toward risk taking seems to be especially important. In any event, effective and timely supervision by the Finance Board will be even more critical going forward.

---

35. According to Murphy (1999, 2489), most executive pay packages contain four basic components: a base salary, an annual bonus tied to accounting performance, stock options, and long-term incentive plans (including restricted stock plans and multiyear accounting-based performance plans).
36. Profitability targets generally tend to be based on the difference (spread) between pre-FAS 133 net income (per dollar of equity) and LIBOR. Many of the plans also tend to leave significant discretion to the board of directors to determine annual incentive compensation.

Conclusion

Historically, the twelve Federal Home Loan Banks provided low-cost liquidity to the mortgage market via collateralized advances to specialized mortgage lenders. Credit losses on those advances have literally been zero since 1932. However, legislative changes in the wake of the thrift crises spurred the Banks to expand in terms of both size and scope. In addition to advances, FHLB balance sheets have also come to include a substantial investment in mortgages and mortgage-backed securities. The attendant interest rate risk has created financial and accounting difficulties at some of the Banks. These troubles caught many observers off guard because they have come to think of the cooperatively owned FHLBs as low-risk institutions.

Like Fannie Mae and Freddie Mac, the FHLB System is a GSE that funds itself largely with federal agency debt obligations that are perceived by investors to be implicitly guaranteed by the U.S. government. While the incentive effects of such guaranteed liabilities on investor-owned firms are quite well understood, the impact on cooperatively owned firms is less obvious and dependent on the firms' structure. We identified some differences between the FHLB System and Fannie Mae and Freddie Mac that can result in differential risk-taking incentives. Importantly, we find that cooperative ownership itself does not reduce FHLB risk-taking incentives because, unlike many mutuals, the FHLB System does not bundle its equity and debt claims. We also find that Bank risk-taking incentives may be heightened by the joint-and-several liability provision in their consolidated debt obligations and a lack of equity market discipline, including a weakened role for nonmarketable charter value. However, the FHLBs cannot avail themselves of equity-based managerial compensation (particularly stock options), which creates high-powered risk-taking incentives in stock-owned firms. Thus, it is unclear whether the FHLBs' risk-taking incentives are necessarily weaker than those at Fannie Mae and Freddie Mac.

The Federal Home Loan Bank System has been financially sound since its inception in 1932. However, the Banks' incentives and ability to take risk expanded in recent years, and no claimant appears well positioned to provide strong discipline. This situation makes the Finance Board's supervisory task all the more challenging and important.

REFERENCES

Bair, Sheila. 2003. Is the Federal Home Loan Bank System forsaking its roots? <http://www.fanniemae.com/commentary/pdf/071403.pdf;jsessionid=XTZUWWAACKXRJJ2FQSHSFGI> (August 18, 2006).

Baker-Botts LLP. 2003. Report to the board of directors of the Federal Home Loan Mortgage Corporation: Internal investigation of certain accounting matters, December 10, 2002–July 21, 2003. <www.freddiemac.com/news/board_report> (August 18, 2006).

Bennett, Rosalind L., Mark D. Vaughan, and Timothy J. Yeager. 2005. Should the FDIC worry about the FHLB? The impact of Federal Home Loan Bank advances on the Bank Insurance Fund. FDIC Center for Financial Research Working Paper 2005-10. <www.fdic.gov/bank/analytical/cfr/2005/wp2005/CFRWP_2005_10_Bennett_Vaughan_Yeager.pdf> (August 18, 2006).

Carnell, Richard S. 2005. Handling the failure of a government-sponsored enterprise. *Washington Law Review* 80 (August): 565–642.

Christman, Raymond R. 2005. Testimony before the Committee on Banking, Housing, and Urban Affairs, U.S. Senate. April 20. <http://banking.senate.gov/_files/christman.pdf> (August 18, 2006).

Emmons, William R., and Gregory E. Sierra. 2004. Executive compensation at Fannie Mae and Freddie Mac. Federal Reserve Bank of St. Louis Supervisory and Policy Analysis Working Paper 2004–6. <www.stlouisfed.org/banking/SPA/WorkingPapers/SPA_2004_06.pdf> (August 18, 2006).

Esty, Benjamin C. 1997. Organizational form and risk taking in the savings and loan industry. *Journal of Financial Economics* 44, no. 1:25–55.

Federal Home Loan Bank of Chicago. 2005. 3rd quarter dividend and capital stock actions announced. News release, October 18. <www.fhlbc.com/fhlbc/docs/press_release/general/2005/2005_3Q_FHLBC_dividend.pdf> (August 18, 2006).

Federal Home Loan Banks Office of Finance. 2004. Federal Home Loan Banks: Quarterly financial report for the six months ended June 30, 2004. <www.fhlbof.com/specialinterest/finreportframe.html> (August 18, 2006).

Federal Housing Finance Board. 2006. FHFB authorizes debt issuance by the Federal Home Loan Bank of Chicago. News release, April 18. <www.fhfb.gov/GetFile.aspx?FileID=4579> (August 18, 2006).

Frame, W. Scott. 2003. Federal Home Loan Bank mortgage purchases: Implications for mortgage markets. Federal Reserve Bank of Atlanta *Economic Review* 88, no. 3:17–31.

Frame, W. Scott, and Larry D. Wall. 2002. Fannie Mae's and Freddie Mac's voluntary initiatives: Lessons from banking. Federal Reserve Bank of Atlanta *Economic Review* 87, no. 1:45–59.

Frame, W. Scott, and Lawrence J. White. 2004. Regulating housing GSEs: Thoughts on institutional structure and authorities. Federal Reserve Bank of Atlanta *Economic Review* 89, no. 2:87–102.

———. Forthcoming. Charter value, risk-taking incentives, and emerging competition for Fannie Mae and Freddie Mac. *Journal of Money, Credit, and Banking*.

Goldfeld, Stephen M., Dwight M. Jaffee, and Richard E. Quandt. 1980. A model of FHLBB advances: Rationing or market clearing? *Review of Economics and Statistics* 62, no. 3:339–47.

Green, Richard K., and Susan M. Wachter. 2005. The American mortgage in historical and international context. *Journal of Economic Perspectives* 19, no. 4:93–114.

Greenspan, Alan. 2004. Government-sponsored enterprises. Testimony before the Committee on Banking, Housing, and Urban Affairs, U.S. Senate. February 24. <www.federalreserve.gov/boarddocs/testimony/2004/20040224/default.htm> (August 18, 2006).

Hansmann, Henry. 1996. *The ownership of enterprise*. Cambridge, Mass.: Harvard University Press.

Hoffmann, Susan, and Mark Cassell. 2002. What are the Federal Home Loan Banks up to? Emerging views of purpose among institutional leadership. *Public Administration Review* 62, no. 4:461–70.

Jaffee, Dwight. 1976. The Federal Home Loan Bank System since 1965. *Carnegie-Rochester Conference Series on Public Policy* 4:161–203.

———. 2003. The interest rate risk of Fannie Mae and Freddie Mac. *Journal of Financial Services Research* 24, no. 1:5–29.

Kopecki, Dawn. 2005. Fannie says $2.4B in additional losses possible. Dow Jones Newswires, March 17.

Lamm-Tennant, Joan, and Laura T. Starks. 1993. Stock versus mutual ownership structures: The risk implications. *Journal of Business* 66, no. 1:29–46.

Lee, Soon Jae, David Mayers, and Clifford W. Smith Jr. 1997. Guaranty funds and risk-taking: Evidence from the insurance industry. *Journal of Financial Economics* 44, no. 1:3–24.

Marcus, Alan J. 1984. Deregulation and bank financial policy. *Journal of Banking and Finance* 8, no. 4:557–65.

Mays, Elizabeth. 1989. A profit-maximizing model of Federal Home Loan Bank behavior. *Journal of Real Estate Finance and Economics* 2:331–47.

Murphy, Kevin J. 1999. Executive compensation. In *Handbook of labor economics*, vol. 3B, edited by Orley Ashenfelter and David Card. Amsterdam: Elsevier.

Nickerson, David, and Ronnie Phillips. 2004. The Federal Home Loan Bank System and the Farm Credit System: Historic parallels and implications for systemic risk. In *Too big to fail: Policies and practices in government bailouts*, edited by Benton Gup. Westport, Conn.: Praeger Books.

Paletta, Damian. 2006. FHLBs "strongly urge" FHFB to pull retained earnings plan. Dow Jones Newswires, May 4.

Paul, Weiss, Rifkind, Wharton, and Garrison LLP. 2006. A report to the Special Review Committee of the Board of Directors of Fannie Mae, February 23. <http://download.fanniemae.com/report.pdf> (August 18, 2006).

Quigley, John M. 2005. Federal credit and insurance programs: Housing. Paper presented at Federal Reserve Bank of St. Louis conference "Federal Credit and Insurance Programs," October 20–21. <http://research.stlouisfed.org/conferences/policyconf/papers2005/quigley.pdf> (August 18, 2006).

Shadow Financial Regulatory Committee. 2006. Strengthening the capital structure of Federal Home Loan Banks. Statement no. 232, May 8. < www.aei.org/research/shadow/projectID.15/default.asp> (August 18, 2006).

Silber, William L. 1973. A model of the Federal Home Loan Bank System and Federal National Mortgage Association behavior. *Review of Economics and Statistics* 55, no. 3:308–20.

Smith, Terry. 2003. Testimony before the Subcommittee on Financial Institutions of the Committee on Banking, Housing, and Urban Affairs, U.S. Senate. September 9. <http://banking.senate.gov/_files/ACFC.pdf> (August 18, 2006).

Snow, John. 2003. Testimony before the Committee on Financial Services, U.S. House of Representatives. September 10. <www.treas.gov/press/releases/js716.htm> (August 18, 2006).

U.S. General Accounting Office (GAO). 1990. *Government-sponsored enterprises: The government's exposure to risks*. Washington, D.C.: U.S. GAO.

———. 2003. *Federal Home Loan Bank System: Key loan pricing terms can differ significantly*. Washington, D.C.: U.S. GAO.

U.S. Office of Federal Housing Enterprise Oversight (OFHEO). 2003. *Report of the special examination of Freddie Mac*. December. <www.ofheo.gov/media/pdf/specialreport122003.pdf> (August 18, 2006).

———. 2004. *Report of findings to date: Special examination of Fannie Mae*. September 17. <www.ofheo.gov/media/pdf/FNMfindingstodate17sept04.pdf> (August 18, 2006).